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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/581,507

04/25/2007

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514862003600

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20872 7590 05/29/2008
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EXAMINER

ARIANI, KADE

ART UNIT

PAPER NUMBER

1651

MAIL DATE

DELIVERY MODE

05/29/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/581,507	Applicant(s) HOLMGREN ET AL.	
	Examiner KADE ARIANI	Art Unit 1651	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 January 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-33 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

The amendment filed on January 26, 2008, has been received and entered.

Claims 1-33 are pending in this application.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Applicant arguments are persuasive, therefore, the rejection of claims 29-31 under 35 U.S.C. 101, is withdrawn.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1- 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wu (in IDS US Patent No. 4,840,903) in view of Nag Raj & Hughes (in IDS, New Zealand Journal of botany, 1974, Vol. 12. p.115-129) and further in view of Tengerdy et al. (Biochemical Engineering Journal, March 2003, Vol. 13, p.169-179) and further in view of Lee et al. (Biotechnology Letters, 1999, Vol. 21 p.965-968) and further in view of Duff

& Murray (Bioresource Technology, 1996, Vol. 55, p.1-33) and further in view of Sun et al. (in IDS Bioresource Technology, 2002, Vol. 83, p.1-11) and further in view of Merchant et al. (Biotechnology Letters, 1988, Vol. 10, No. 7. p. 513-516) and further in view of Clausen et al. (Proceedings of the 4th meeting of the Pan American Biodeterioration Society; 1994, New York Press: p.231-242).

Claims 1-33 are drawn to a process (for the production of ethanol through fermentation of organic starting materials, the process comprising, metabolizing pentose compounds of the organic starting materials using at least one fungus belonging to the species *Chalara* (capable of metabolizing pentose compounds), fungi *Chalara parvispora*, fungus is used in a mix of fungi, second fungus is *Trametes versicolor*, mix of fungi comprises at least one of *Trichoderma viride*, *Thielavia terrestris*, *Posita placenta*, *Gloeophyllum trabeum*, *Phanerochaete chrysosporium* or a combination thereof, yeast species *Saccharomyces* (*Saccharomyces cerevisiae*), batch fermentation, a continuous process, the pH is adjusted to the range of 4.5 –7, the temperature is in the interval of about 26 to about 36°C, the starting material is wood or non-wood plant material (spent liquor from pulping), a starter culture comprising *Chalara parvispora*, and at least one fungus from *Trametes* species, *Trametes versicolor* (*Trichoderma viride*, *Thielavia terrestris*, *Posita placenta*, *Gloeophyllum trabeum*, *Phanerochaete chrysosporium*), a yeast, and a growth medium.

Applicant's arguments filed on 1/26/2008 have been fully considered but they are not persuasive.

Applicant argues that the claims are not obvious and the examiner has not articulated a rationale to combine the references and support a conclusion of obviousness.

However, Wu teaches a process for the production of ethanol through fermentation of organic starting materials by a fungus species capable of metabolizing xylose (pentose) and glucose (hexose) (Abstract and Fig 4.), and a yeast capable of xylose fermentation (column 6, lines 18-10).

Wu teaches batch fermentation, continuous fermentation (column 4, lines 28-31), pH is adjusted to about pH 6.0 (column 4, Table 1), temperature is in the interval of about 26-36°C (column 5, lines 55), a process of producing ethanol from starch (column 6, Example V), and a growth medium for a fungus comprising 0.1 g CaCl₂, 0.5g MgSO₄·7H₂O, 1.0 g KH₂PO₄, NaCl, D-xylose, mannose, D-galactose (column 4 lines 13-15 and Table II, also column 5).

Wu teaches D-glucose, D-cellobiose, and with D-xylose from hemicellulose, comprise the three most important and abundant renewable hydrolysates of any plant biomass (column 6, lines 9-13). Xylose is by far the largest constituent of hemicellulose and has been one of the most difficult to ferment to ethanol on an economic basis (column 5, lines 67- and column 6 lines 1-3). If a microorganism can ferment both D-cellobiose and D-xylose, it will reduce the end-product inhibition of cellulase during enzymatic hydrolysis of cellulose and thus enhance ethanol production (column 6 lines 34-38).

Wu does not teach metabolizing pentose using at least one fungus belonging to the species of *Chalara*. However, Nag Raj & Hughes teach *Chalara parvispora* and that

Chalara species are capable of growing on wood and decayed wood (see the whole document especially page 117).

Wu does not teach using *Trametes versicolor*. However, Lee et al. teach ethanol is an effective stimulator for laccase production in a culture of *Trametes versicolor*, and the important role of laccase in degrading lignin in wood pulp and in decolorizing and detoxifying the vast amount of effluents generated by the pulp and paper industry (p. 965, Abstract, and Introduction).

Moreover, Duff & Murray teach cellulolytic fungi of *Trichoderma* species, and fungus *Phanerochaete chrysosporium* and teach these organisms use cellulose as a primary carbon source and are of industrial interest for their potential to convert waste woody cellulosic materials to biofuel (p.7, 2nd column, lines 7-16). Duff & Murray further teach ethanol fermentation by yeast *S. cerevisiae* (p.20, 1st column, 2nd paragraph, lines 5-11).

Duff & Murray further teach one of the identified weaknesses of early efforts to develop viable wood-to-ethanol bioconversion processes has been the lack of organism capable of fermenting pentose sugars. Once this need was identified, a considerable effort was mounted to isolate organisms capable of fermenting pentose sugars to alcohol (p. 20, end paragraph).

Further motivation to modify the method of Wu to use a host-specific fungi and a mixed starter culture is in Tengerdy et al. who teach mixed cultivation and using specific fungi that produce an optimal enzyme complex for the degradation of the host lingocellulose, Tengerdy et al. further teach lingocellulosic biomass (energy crops) and wastes (forest, agricultural, and municipal) represent a vast potential alternative

resource for ethanol production. Enzymatic hydrolysis of lingocellulose to hexoses and pentoses by lingocellolytic enzymes is a mild treatment in simple equipment and with great potential for improvement, cost reduction and higher hydrolytic efficiency due to the presence of an optimal enzymes complex produced by host-specific fungi in single or mixed culturing (p.172 1st column end paragraph, and 2nd column 2nd paragraph and p. 173 1st column 1st paragraph).

Furthermore, Sun et al. teach cellulose degrading activity of fungus *Phanerochaete chrysosporium* and species of *Trichoderma viride* (p.6, 1st column, 3rd paragraph and p.7, 2nd column). Also, at the time the invention was made lingocellulosic activity of fungi *Thielavia terrestris* (Merchant et al.), *Posita placenta*, and *Gloeophyllum trabeum* (Clausen et al.) were very well known in the art.

Therefore, in view of the above teachings, it would have been obvious to one of ordinary skill in the art to modify the method of Wu et al. and to use a mixed culture of host-specific fungi *Chalara parvispora* as taught by Nag Raj & Hughes and *Trametes versicolor* as taught by of Lee et al. in the method of Wu to provide a process for the production of ethanol. The motivation as taught by Tengerdy et al. would be to use specific fungi that produce an optimal enzyme complex for the degradation of the host lingocellulose with potential for improvement, cost reduction and higher hydrolytic efficiency.

Conclusion

No claims are allowed.

THIS ACTION IS MADE FINAL. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kade Ariani whose telephone number is (571) 272-6083. The examiner can normally be reached on 9:00 am to 5:30 pm EST Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Wityshyn can be reached on (571) 272-0926. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Leon B Lankford Jr/
Primary Examiner, Art Unit 1651

Kade Ariani
Examiner
Art Unit 1651